

A study on smartphone addiction and its effects on sleep quality among nursing students in a municipality town of West Bengal

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ABSTRACT

Background: Smartphones are now an important gadget for us, but the many are getting addicted to it. Researchers showed that smartphone addiction and late-night usage affects sleep quality. Indian nurses are already facing a heavy burden of depression and present position of nurses is quite insecure. Very few studies were performed over nursing students and that leads to the selection of this topic for my research. **Methodology:** It was a cross-sectional, observational, and questionnaire-based study, performed over B.Sc. Nursing students of University College of Nursing, WBUHS. The questionnaire has three parts. The first part was for sociodemographic variables, the second part measures the addictive phenomena associated with smartphone overuse using a Smartphone Addiction Scale (SAS), the last part was intended to measure the sleep quality by using Pittsburgh Sleep Quality Index (PSQI). Collected data was compiled and analyzed with the help of MS-Excel from Microsoft Office Package-2016. **Results:** Out of 91 students, 46 students were found to be not addicted, while 45 were addicted to smartphone, as measured by SAS. On PSQI, 17.58% students were found to be good sleepers, while 82.42% came out to be poor sleepers. Significant association was found between age and smartphone addiction ($p=0.000031$) and between daily calls and sleep quality ($p=0.025333$). **Conclusion:** It can be finally concluded that increase in smartphone usage is now a serious matter of concern and lower age groups are more susceptible towards it. Broad-spectrum studies involving multiple institutions is needed to reveal the bigger picture

Keywords: Addiction, nursing students, smartphone

Introduction

Mobile phones, which were considered as a luxurious gadget a few years ago, now have become an absolute necessity for people across the globe. Statistics showed above 5 billion people were using mobile phones in 2019. Indian scenario is not far behind; a survey by eMarketer in 2015 estimated that India would cross 800

million mobile phone users in 2019.^[1] According to Cisco's 13th annual Visual Networking Index (VNI), 829 million people will be using smartphones by 2022.^[2]

Addiction is defined by WHO as dependence, as the continuous use of something for the sake of relief, comfort or stimulation, which often causes cravings when it is absent.^[3] Two major categories of addiction involve Substance Addiction (e.g. Drug or alcohol addiction) and Behavioral Addiction (e.g. Mobile phone or internet addiction).^[4]

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Recent research show that smartphone addiction has widespread adverse effects and females are more susceptible for addiction.^[5] Unrestricted late-night smartphone use has turned out to a major lifestyle problem these days, and can lead to stress, depression, anxiety, and even more serious complications like daytime somnambulism,^[6] occasional violent outbursts.^[7]

In all, 73% of teens have a feeling that using social media too much could result in some conditions that can result in school shootings; everyday 56% of teens come online intending to do something, but get diverted and do something else for a longer duration; 80% of teens regularly keep using their phone even after they go to bed; 32% of teens themselves want to reduce the use of their phones; and 70% of teens have merely 3-5 apps or sites that they continuously cycle through repeatedly, according to “Teen Smartphone Addiction National Survey 2018” by Screen Education.^[8] Therefore, this study is also relevant to practicing primary care physicians as it reflects an image about the entire teenage population. Therefore, physicians can get suggestive clues on underlying causes of insomnia, anxiety, stress, and depressions in teenagers.

Smartphone addiction, specifically late-night smartphone use is likely to affect sleep quality, which can be further worsened by additional factors like increased anxiety, depression, workload and so on. Burden of depression is already heavy in an Indian nursing student. An analytical, cross-sectional study was conducted by Chatterjee S, Saha I, Mukhopadhyay S, Misra R, Chakraborty A, Bhattacharya A, among 180 students of a nursing college, and depression was prevalent in 63.9% of the students, though mostly mild in grade. There was a statistically significant higher degree of depression among the first-year students ($P = 0.008$).^[9]

The present position of nurses in India, specifically in West Bengal, is quite insecure and they are being criticized now and then. Recently, two nursing students were apprehended in killing of 16 puppies in NRS Medical College, Kolkata.^[10] Moreover, a nursing student is also susceptible to sleep-deprivation due to night-duties, and the sleep quality can be further worsened by addictive smartphone use till late at night.

This topic is chosen because very few studies are performed over undergraduate nursing students on this topic in India or West Bengal. This will give us a picture depicting sleep-patterns and smartphone abuse of would-be nurses, who, are undoubtedly, a pillar of a successfully working community healthcare system.

Review of Literature

Smartphone overuse, better to say abuse, has been a major concern for last decade and many research have been performed on prevalence of smartphone addiction as well as its association with other psychosocial behavior like depression, anxiety, effect on sleep quality etc., As the teenage population is more prone to develop addiction over internet or smartphone, majority

of the studies have been focused on adolescents or teenagers. Both the planning authorities and the practicing physicians to be benefited by such studies, by providing smartphone usage guidelines specially in emergency training courses or physicians by understanding the prevalence of smartphone abuse and/or average sleep-quality status of teenagers.

According to a study entitled “*Assessment of Smartphone Addiction among adolescents in a University*”, published on 31 March 2020, by Kundapur R, Hanglur Narasimha H and Baisil S among 426 Indian adolescents revealed that the prevalence of smartphone addiction was 57% in the study population, females had higher addiction scores than males.^[11]

School students at their teens are also liable for developing addiction on smartphones. A cross-sectional analytical study named “*Usage of Online Social Networking Sites among School Students of Siliguri, West Bengal, India*” was performed among 388 students and the results showed 87.1% of students were using social networking sites and 70.7% of students were found to be addicted.^[12]

Medical professionals usually provide emergency services and addiction among them and its adverse effects on performance can be a serious matter of concern. A cross-sectional study, titled “*How addicted are newly admitted undergraduate medical students to smartphones? : a cross-sectional study from Chitwan medical college, Nepal*” was published in 2 March, 2020 among 250 undergraduate medical students and smartphone addiction among medical students was estimated at around 36.8% with higher percentage of male smartphone addicts.^[13]

Adverse effects of smartphone on sleep-quality of medical students had been brought into the limelight of academic interest several years ago. A total of 240 undergraduate medical students of KIMS, Hubballi participated in a cross-sectional study that showed the number of poor and good sleepers were 117 and 123, respectively, according to PSQI global sleep score. According to Smartphone Addiction score 123 (51.2%) were low users and 117 (48.75%) were high users.^[14]

A few years ago, smartphone addiction among nursing students in India was a neglected topic; but now it has emerged and the research results are providing valuable suggestions for lifestyle enhancement of ‘would-be’ medical personnel. In 19 May 2020, a cross-sectional study was published, named “*Impact of smartphone addiction on depression and self-esteem among nursing students*”. It was conducted among 320 Nursing students of Cairo University, and the study observed that 95.8% of nursing students reported smartphone addiction, with a significant correlation between smartphone addiction and the levels of depression.^[15]

Sleep disorders among nursing students are also a matter of academic interest nowadays. In 2011, a cross-sectional study was performed in Italy and insomnia was prevalent in 26.7%, among all 364 nursing students. On multiple logistic regression, greater age was found to have a significant association with increased risk of insomnia.^[16]

Aims and Objectives

1. To find out the prevalence of smartphone addiction among undergraduate nursing students in University College of Nursing, WBUHS, in Kalyani, Nadia in West Bengal.
2. To assess quality of sleep among undergraduate nursing students and to establish any association, if present, between smartphone-addiction, poor sleep quality and their sociodemographic condition.

Materials and Methods

- a. **Study design:** Cross-sectional study.
- b. **Type of study:** Observational, Questionnaire-based study which will be self-administered.
- c. **Study site:** University College of Nursing, WBUHS, in Kalyani, Nadia.
- d. **Duration of the study:** The study commenced from June 2019; then it got approved by Scientific Review Committee followed by Institutional Ethics Committee. There were different dates for data collection in June and considering data entry and data analysis, followed by preparation of report, which nearly took 2 months (as the academic curriculum of 2nd year was going on simultaneously). So the study was continued up to August 2019.
- e. **Study population:** B.Sc. Nursing students of 1st year and 2nd year of University College of Nursing, WBUHS, in Kalyani, Nadia.
- f. **Selection criteria:** The undergraduate nursing students from 1st to 2nd years of the concerned institution available at the days of data collection.
- g. **Inclusion criteria:**
 - i. Undergraduate nursing students from 1st to 2nd years, of University College of Nursing, WBUHS, in Kalyani, Nadia in West Bengal who were present at the days of data collection.
 - ii. Those who will give written consent after understanding the objectives of the study by signing the Informed Consent Form (ICF) after reading it properly.
 - iii. Those who are physically in a position to understand and co-operate with the investigator in filling up the questionnaire.
- h. **Exclusion criteria:**
 - i. Students who are unavailable, that is, having ward duty at the time of data collection or those who were absent on those dates.
 - ii. Those who won't give consent by signing the ICF.
- i. **Study area:** University College of Nursing, WBUHS, in Kalyani, Nadia in West Bengal.
- j. **Sample size:** The proposed college has three batches of nursing students, each batch having 60 students. Among them, 3rd year students were unavailable as they will be posted for hospital duties round the clock. Between 120 students of 1st and 2nd years, as mentioned in the inclusion criteria, 45 students from 1st year and 46 from 2nd year, total 91 students were present on the specified dates for data collection, and

they were selected by enrollment method as all of them gave consent by signing the ICF after reading and understanding the ICF properly.

- k. **Sampling (Recruitment of the participants):** Out of 60 students from each batch, 45 students from 1st year and 46 from 2nd year: total 91 students were present on days of data collection and all of them gave consent. They were selected by manual enrollment method.
1. **Tools:** The semi-structured questionnaire has three parts:
 1. The first part carries sociodemographic and personal questions such as age, duration of mobile phone use, number of phone calls per day, family income, type of family, and number of family members. This is partly based on Problematic Mobile Phone Use Questionnaire (PMPUQ) which seeks to explore problematic use of mobile phones.^[17]
 2. The addictive phenomena associated with overuse of smartphone was estimated using a Smartphone Addiction Scale (SAS). This questionnaire has 33 items with a six-point Likert Scale and the total score is ranged by 33-198. The items are directed to assess the smartphone addiction in six factors: daily-life disturbance, positive anticipation, withdrawal, cyberspace-oriented relationship, overuse, and tolerance. This questionnaire is validated through several studies, and its internal consistency or concurrent validity was verified (Cronbach's alpha is 0.967).^[18]
 3. The sleep quality was assessed by using the Pittsburgh Sleep Quality Index (PSQI). The measure consists of 19 individual items, creating 7 components that produce one global score. The score ranges from 0 to 21, and the cutoff score for good sleepers is ≤ 5 . Fairly acceptable consistency (test-retest reliability) and validity were obtained. A global PSQI score greater than 5 yielded a diagnostic sensitivity of 89.6% and specificity of 86.5% in distinguishing good and poor sleepers.^[19] It was developed by the researchers the University of Pittsburgh.^[20]

Some alterations are made according to the local requirements, and the modified questionnaire is introduced to 10 undergraduates (2nd year) MBBS students of College of Medicine and JNM Hospital, Kalyani, Nadia. The responses were noted and requisite alterations were done before finalizing the semi-structured proforma.^[21]

- m. **Data Collection Procedure:** A letter was first forwarded by the Head of the Department of Community Medicine and submitted to the Principal of College of Medicine and JNM Hospital. Thereafter, it was duly forwarded to the Institutional In-charge of the proposed nursing college seeking the permission to carry out the study. The principal of the concerned nursing college granted the permission to study on their undergraduate nursing students. Then approval from SRC followed by IEC was obtained before commencing the study. Dates of the data collection were announced 1 week earlier

to the students through their co-ordinators. The data collection took place at a stipulated seminar-room of the University College of Nursing, WBUHS, in Kalyani, Nadia, in presence of the faculty members of that institution. On the days of data collection, firstly, the participants were introduced to the investigator by the principal of the concerned institution. An explanation of the study and assurance about confidentiality of the data collected were given in an introductory session. Before distributing the questionnaire, a separately written ICF, (not attached with the questionnaire) was signed by them, with the assurance that the privacy and security of the information provided by them will be maintained at all cost; moreover, any point that can reveal the identity of the participants won't be asked in the main questionnaire. They were also informed that it was all voluntary and they had the freedom to withdraw from the study at any time during the study period without the loss of benefits that the participant would otherwise be entitled. Then the main questionnaires were distributed among the participants and the questions were explained properly with clearing of all the doubts asked by them. It took nearly 30-40 minutes to fill up all the questions. Then they were collected properly to begin the data entry.

- **Statistical Analysis:** The collected data were compiled and analysed with the help of the appropriate software package like MS-Excel from Microsoft Office Package-2016. Whenever necessary, descriptive statistical methods were applied with the help of tables and charts. In some cases, Tests of Significance (Chi-square) was applied to check the association.

Ethical Considerations: Regarding the ethical aspects of the research,

- First' the study plan was reviewed and scrutinized by the Scientific Review Committee (SRC) of the institution. The investigator gave a brief PowerPoint presentation and necessary modifications were done. Then the proposal was forwarded to the Institutional Ethics Committee for ethical clearance.
- After that, the clearance was obtained from Institutional Ethics Committee (IEC) by following proper guidelines and as per the suggestion of IEC, a few alterations were made. The data collection phase began after obtaining the ethical clearance.

Observations and Results

- **Information regarding sociodemographic profile:**

Total 91 students participated in this programme: 45 participants (49.45%) were from 1st year, rest 46 (50.55%) were from 2nd year, all of them are female.

Table 1 summarises the sociodemographic data (collected from the questionnaire based on PMPUQ)

Table 1: Sociodemographic Variables

Variables	Groups	Number	Percentage
Year of Study	1 st YEAR	45	49.45
	2 nd YEAR	46	50.55
Age	<20 years	30	32.97
	20-21 years	53	58.24
	>21 years	8	08.79
Type of Family	Joint	14	15.38
	Nuclear	77	84.62
Family Members	2	3	03.30
	3	20	21.98
	4	39	42.86
	5	13	14.29
	>5	16	17.58
Income per head (Family income/No. of Family members)	0-2500	23	27.06
	2501-5000	25	29.41
	5001-7500	14	16.47
	7501-10000	7	8.24
	10000+	16	18.82

Table 2: Values on Smartphone Usage

Variables	Groups	Number	Percentage
Duration of owning a smartphone (in years)	< 1 year	18	19.78
	1-5 years	70	76.92
	> 5 years	3	03.30
Duration of daily smartphone usage (in minutes)	≤120	26	28.57
	>120 but ≤180	19	20.88
	>180 but ≤240	23	25.27
	>240 but ≤300	14	15.38
	>300	9	09.89
Number of Calls per Day	< 3	12	13.19
	3-5	46	50.55
	> 5	33	36.26
Smartphone Addiction Scale	Not Addicted (SAS score ≤101)	46	50.55
	Addicted (SAS score >101)	45	49.45

Information regarding Smartphone Usage:

The smartphone addiction was measured by the application of SAS and the mean SAS score was 102.85, with a minimum score of 52 and maximum of 167. The median was found to be 101, and subjects, who scored 101 or less, are considered as not addicted and those who got higher than 101 are taken as addicted. With this, 46 students (50.55%) were found to be not addicted (i.e. SAS score ≤101) while 45 (49.45%) were addicted.

Table 2 summarises the values on smartphone usage.

- **Information regarding Sleep Quality:**

Now, according to the data recorded by application of PSQI, 16 students (17.58%) were found to be good sleepers who scored 5 or less than 5 in Global PSQI Score, while 75 (82.42%) came out to be poor sleepers who scored more than 5. Minimum PSQI

Table 3: Sleep Quality

Variables	Groups	Number	Percentage
Sleep Quality	Good Sleeper (PSQI score ≤ 5)	18	19.78
	1-5 years (PSQI score > 5)	70	76.92
Component Number	Name of the Component	Average	Standard Deviation
C1 (#9 Score)	Subjective Sleep Quality	1.12	0.78
C2 (#2+#5a Score)	Sleep Latency	1.42	1.30
C3 (#4 Score)	Sleep Duration	1.75	0.73
C4 (Total sleep/Total time in Bed $\times 100$)	Habitual Sleep Efficiency	0.30	0.69
C5 (Sum of #5b to #5j)	Sleep Disturbances	5.18	3.64
C6 (#6 Score)	Sleep Medications	0.03	0.18
C7 (#7+#8 Score)	Daytime Dysfunction	1.07	1.49
Sum of C1-C7	Global PSQI Score	10.87	5.49

Table 4: Relation between Smartphone Addiction and Sociodemographic Factors

Association between Smartphone Addiction and Age				
Age group (years)	Not addicted	Addicted	Row Totals	
18-19	5 (15.16) [6.81]	25 (14.84) [6.96]	30	P=0.000031*
20-21	35 (26.79) [2.52]	18 (26.21) [2.57]	53	
21+	6 (4.04) [0.95]	2 (3.96) [0.97]	8	
Column Totals	46	45	91 (Grand Total)	
Association between Smartphone Addiction and Type of Family				
Type Of Family	Not Addicted	Addicted	Row Totals	
Joint	7 (7.08) [0.00]	7 (6.92) [0.00]	14	P=0.964345
Nuclear	39 (38.92) [0.00]	38 (38.08) [0.00]	77	
Column Totals	46	45	91 (Grand Total)	
Association between Smartphone Addiction and No. of Family Members				
No. of Family Members	Not Addicted	Addicted	Row Totals	
2	2 (1.52) [0.15]	1 (1.48) [0.16]	3	P=0.954377
3	10 (10.11) [0.00]	10 (9.89) [0.00]	20	
4	20 (19.71) [0.00]	19 (19.29) [0.00]	39	
5	7 (6.57) [0.03]	6 (6.43) [0.03]	13	
5+	7 (8.09) [0.15]	9 (7.91) [0.15]	16	
Column Totals	46	45	91 (Grand Total)	
Association between Smartphone Addiction and Per Head Income of Family				
Income	Not Addicted	Addicted	Row Totals	
0-2500	15 (11.64) [0.97]	8 (11.36) [1.00]	23	P=0.408631
2501-5000	13 (12.65) [0.01]	12 (12.35) [0.01]	25	
5001-7500	6 (7.08) [0.17]	8 (6.92) [0.17]	14	
7501-10,000	2 (3.54) [0.67]	5 (3.46) [0.69]	7	
10,000+	7 (8.09) [0.15]	9 (7.91) [0.15]	16	
Column Totals	43	42	85 (Grand Total)	
Association between Smartphone Addiction and Duration of Owning a Smartphone				
Owning A Smartphone	Not Addicted	Addicted	Row Totals	
<1	10 (9.10) [0.09]	8 (8.90) [0.09]	18	P=0.635287
1 or more	36 (36.90) [0.02]	37 (36.10) [0.02]	73	
Column Totals	46	45	91 (Grand Total)	

*Significant

score was found to be 1 and maximum score was 27, with a median of 11. The mean PSQI score was 10.87 and the standard deviation was calculated as 5.49.

Data on sleep-quality and all seven components of PSQI were recorded in Table 3.

• Association of Smartphone Addiction and Sociodemographic Factors:

Relation between smartphone addiction and different sociodemographic factors are plotted in Table 4. The factors that have been considered were age, type of family, number of

Table 5: Association between Sleep Quality and sociodemographic variables

Distribution of students according to Sleep Quality and Age				
Age	Good sleeper	Poor sleeper	Row Totals	
less than 20	6 (5.27) [0.10]	24 (24.73) [0.02]	30	P=0.870738
20-21	9 (9.32) [0.01]	44 (43.68) [0.00]	53	
more than 21	1 (1.41) [0.12]	7 (6.59) [0.03]	8	
Column Totals	16	75	91 (Grand Total)	
Distribution of students according to Sleep Quality and Type of Family				
Type of Family	Good Sleeper	Poor Sleeper	Row Totals	
Joint	1 (2.46) [0.87]	13 (11.54) [0.19]	14	P=0.264633
Nuclear	15 (13.54) [0.16]	62 (63.46) [0.03]	77	
Column Totals	16	75	91 (Grand Total)	
Relation of Sleep Quality with Number of Family Members				
Number of Family Members	Good Sleeper	Poor Sleeper	Row Totals	
2	1 (0.53) [0.42]	2 (2.47) [0.09]	3	P=0.542584
3	5 (3.52) [0.63]	15 (16.48) [0.13]	20	
4	6 (6.86) [0.11]	33 (32.14) [0.02]	39	
5	3 (2.29) [0.22]	10 (10.71) [0.05]	13	
More than 5	1 (2.81) [1.17]	15 (13.19) [0.25]	16	
Column Totals	16	75	91 (Grand Total)	
Distribution of students according to Sleep Quality and Per Head Income				
Income	Good Sleeper	Poor Sleeper	Row Totals	
0-2500	4 (3.52) [0.07]	19 (19.48) [0.01]	23	P=0.857056, (n=85)
2501-5000	5 (3.82) [0.36]	20 (21.18) [0.07]	25	
5001-7500	1 (2.14) [0.61]	13 (11.86) [0.11]	14	
7501-10,000	1 (1.07) [0.00]	6 (5.93) [0.00]	7	
10,000+	2 (2.45) [0.08]	14 (13.55) [0.01]	16	
Column Totals	13	72	85 (Grand Total)	

Table 6: Relation Of Sleep Quality With Smartphone Usage

Association Of Sleep Quality With Duration Of Owning A Smartphone				
Duration Of Owning A Smartphone	Good Sleeper	Poor Sleeper	Row Totals	
Less Than 1 Year	5 (3.16) [1.06]	13 (14.84) [0.23]	18	P=0.204559
1 Year Or More	11 (12.84) [0.26]	62 (60.16) [0.06]	73	
Column Totals	16	75	91 (Grand Total)	
Association Of Sleep Quality With Duration Of Smartphone Usage				
Duration Of Daily Smartphone Usage	Good Sleeper	Poor Sleeper	Row Totals	
Less Than 120	4 (4.57) [0.07]	22 (21.43) [0.02]	26	P=0.051915#
121-180	7 (3.34) [4.01]	12 (15.66) [0.86]	19	
181-240	4 (4.04) [0.00]	19 (18.96) [0.00]	23	
More Than 240	1 (4.04) [2.29]	22 (18.96) [0.49]	23	
Column Totals	16	75	91 (Grand Total)	
Association Of Sleep Quality With Number Of Calls Per Day				
Calls Per Day	Good Sleeper	Poor Sleeper	Row Totals	
0-2	1 (2.11) [0.58]	11 (9.89) [0.12]	12	P=0.025333*
3-5	13 (8.09) [2.98]	33 (37.91) [0.64]	46	
More Than 5	2 (5.80) [2.49]	31 (27.20) [0.53]	33	
Column Totals	16	75	91 (Grand Total)	

*Significant; [#]Statistically not significant; but having strong tendency to be significant

family members, income per member of the family and duration of owning a mobile phone. A Chi-square test was performed and P values were noted.

Among them, age was found to be significantly associated with smartphone addiction with a P value of 0.000031.

A stacked column chart with age groups on X-axis and number of students on Y-axis was prepared as shown in [Figure 1].

• Association of Sleep Quality with Sociodemographic Variables :

Variation of sleep quality according to age, type of family, number

of family members and per head income is summarised in Table 5. Chi-square test ($N = 91$, except income where $N = 85$) was performed to check the statistical significance and the P value is noted.

• Association of Sleep-Quality with Smartphone Usage :

Relation of sleep-quality is determined by PSQI with duration of owning a smartphone [Q. How long do you (the subject) own a smartphone?], duration of daily smartphone usage and number of calls per day is also checked. The distribution is shown in Table 6. The P values for duration of owning a smartphone,

Table 7: Association between Sleep Quality (PSQI score) and Smartphone Addiction (SAS score)

PSQI score range	NA	A	Row Totals	P
1-5	8 (8.09) [0.00]	8 (7.91) [0.00]	16	$P=0.364957$
6-10	16 (14.66) [0.12]	13 (14.34) [0.13]	29	
11-15	19 (18.20) [0.04]	17 (17.80) [0.04]	36	
16-20	2 (1.52) [0.15]	1 (1.48) [0.16]	3	
20+	1 (3.54) [1.82]	6 (3.46) [1.86]	7	
Column Totals	46	45	91 (Grand Total)	

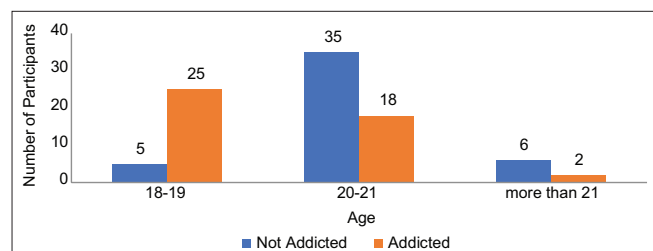


Figure 1: Relation of Smartphone Addiction with Age

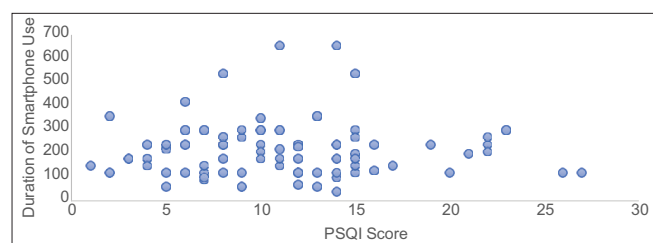


Figure 2: Relation between Sleep Quality and Duration of Daily Smartphone Use

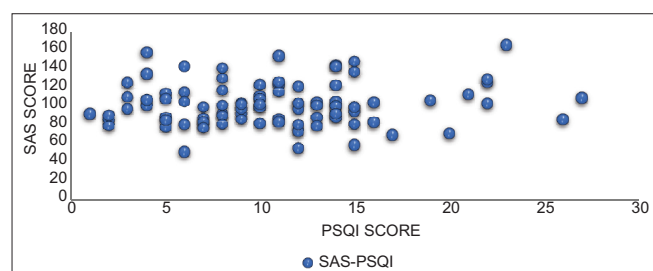


Figure 3: Association between SAS and PSQI scores

duration of daily smartphone usage and number of calls per day is found to be 0.204559, 0.051915 and 0.025333, respectively. Significant P values are marked (*). A scattered diagram [Figure 2] was plotted to show the relation between sleep quality and duration of daily usage of smartphone, which has got a strong tendency to be significant (p -value = 0.051915).

• Association between Sleep Quality (PSQI Score) and Smartphone Addiction (SAS Score)

Association between PSQI and SAS score has been checked and summarised in Table 7. A scattered chart is also prepared by plotting PSQI scores in X-axis and SAS scores in Y-axis, as presented in [Figure 3].

Discussion

The analysis regarding smartphone usage suggests that the average time spent on smartphone daily is 214.62 minutes, that is, certainly a matter of concern as this may adversely affect other responsibilities as students may run out of time. In fact, in question no. 32 of SAS (i.e. always thinking that I should shorten my smartphone-use time), 80 out of 91 students had marked 3 or more in Likert scale, and 64 students marked it as 5 or 6 (agree or strongly agree), proving the fact they are themselves aware of the overuse of smartphone and actively want to reduce this. Detailed analysis with information like on what apps they spend most of their time, usage of social media, using smartphone for academic benefits, etc., should be studied to reveal the bigger picture. The mean SAS score was 102.85, that is compatible with the mean SAS 102.93 found in a cross-sectional study on a sample of 240 undergraduate medical students of KIMS, Hubballi.^[14] A study conducted by Ammati R, Kakunje A, Karkal R, Nafisa D, Kini G, and Chandrashekar P on students of medical universities in south India revealed that 46% of the students were using mobile phones for 4-6 hours and 14% of students were using 7-9 hours in a day.^[22]

While looking for possible associations between smartphone use and sociodemographic factors, it has been found that age is significantly associated (p -value = 0.000031) with higher degree of addiction. Another study conducted by Zencirci SA on university students of Turkey reported similar results where age group 18-20 years (SAS-SV median score is 27) is found to be more addicted than age group of 21-24 years (SAS-SV median score was 25) having a significant statistical association (p -value = 0.009).^[23]

Sleep quality that was assessed using PSQI was found to be strikingly high with a mean score of 10.87 (while global cutoff score is 5). From the different components of PSQI, it has been revealed that decreased sleep duration and various sleep disturbances are the leading cause of poor sleep quality. A cross-sectional questionnaire-based study by Shad R., Thwani R. and Goel A. conducted on medical and non-medical students in India also reported the percentage of poor sleepers

were 62.6%, that was higher in medical students (72.9%) than their non-medical peers (51.9%).^[24] The cross-sectional study conducted by Kurugodiyavar M D, Sushma H R, Godbole M, and Nekar M S at undergraduate medical students of KIMS, Hubballi reported the mean PSQI to be 4.80 and 51.25% were good sleepers, whereas 48.75% were poor sleepers.^[14]

Association of sleep quality with sociodemographic factors was checked and it has failed to show any possible association, the probable reason may be that the course is residential (mandatory). Thus, hostel accommodation may be an important factor that ruled out the points related to family.

Association of sleep quality with different parameters of smartphone usage has also been checked and the association with duration of smartphone use has a strong tendency to be significant (p -value = 0.051915), a broader study with higher sample size involving multiple colleges may provide adequate resources to declare it as significant or not. However, sleep quality is found to be significantly associated with number of calls made per day (p -value = 0.025333). 28.26% were good sleepers among those who make 3-5 calls per day, whereas the percentage of good sleepers among those who make more than five calls daily was merely 6.06%. Mortazavi *et al.* (2011) determined a statistically significant relationship between the number of sleeping problems and the amount of time they used mobile phones for speaking.^[25]

It has been found that low smartphone users (mean PSQI score 10.24) have a slightly better sleep quality than high users (mean PSQI 11.51). The reason behind poor sleep quality may be multifactorial, and smartphone addiction is apparently a strong contributing factor affecting the quality of sleep. There are other factors like depression, anxiety, stress, competition, concerns about family and future, increased workload, and assignments that are contributing to the poor sleep quality. However, the cross-sectional study conducted by Kurugodiyavar M D, Sushma H R, Godbole M, Nekar M S at undergraduate medical students of KIMS, Hubballi, had reported statistically significant association between SAS score and PSQI score (p -value < 0.001).^[14] In a nationwide cross-sectional survey by Munezawa T. among Japanese adolescents, multiple logistic regression analyses showed that mobile phone use for calling and sending text messages after lights out was associated with sleep disturbances.^[26]

Further broad-spectrum study is much needed to reveal the true cause(s) of such poor sleep quality among nursing students. Like others, this study also has some limitations. It is a cross-sectional study that was conducted in a single institution; further prospective studies involving multiple institutions with different age groups should be conducted. Sample size was not adequate, too. The questionnaire was self-administered; other tools of measuring smartphone addiction or sleep quality can be applied.

Conclusion

With the above mentioned findings, it can be concluded that increase in smartphone usage is now a serious matter of concern and lower age groups are more susceptible towards it. The overall sleep quality is strikingly poor and that unleashes many scopes for further research in this field, investigating to find out the actual causes behind poor sleep quality. Smartphone addiction, however, cannot be ignored as it may be a major contributing factor.

Another important aspect of this study is that it may provide valuable hints to primary care physicians who are practicing regularly, regarding cases of depression, anxiety or poor sleep quality among teenagers. For such psychosocial behaviors, smartphone addiction now should not be ignored as a causative factor.

Summary

- A cross-sectional, questionnaire-based study to assess the smartphone addiction and sleep quality among undergraduate nursing students and look for any possible association (if present) has been conducted over 91 students of University College of Nursing, WBUHS, in Kalyani, Nadia, 45 from 1st year and 46 from 2nd year.
- Smartphone Addiction Scale (SAS) and Pittsburgh Sleep Quality Index (PSQI) were used to assess the smartphone addiction and sleep quality, respectively, along with a few questions taken from Problematic Mobile Phone Use Questionnaire (PMPUQ) to assess smartphone usage and sociodemographic factors.
- Statistical analysis showed 82.42% were poor sleepers who scored more than 5 in PSQI and poor sleep quality is associated with higher number of calls made per day (p -value = 0.025333).
- Smartphone addiction is seen in 49.45% of subjects and it has a significant association with age (p -value = 0.000031).
- PSQI and SAS scores failed to show any association: the reason may be multifactorial causation of poor sleep quality, and broad-spectrum study including assessment methods for other factors like stress, anxiety, academic performances etc., should be performed to reveal the bigger picture.

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form, the patient(s) has/have given his/her/their consent for his/her/their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

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Conflicts of interest

There are no conflicts of interest.

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